Aerial Survey Baseline Monitoring in the Continental Shelf Region of the VACAPES OPAREA: 2015 Annual Progress Report

***Submitted to*:**

Naval Facilities Engineering Command Atlantic under Contract No. N62470-15-D-8006, Task Order 05, issued to HDR, Inc.

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Virginia Beach, VA

February 2016

Suggested Citation:
Mallette, S.D., G.G. Lockhart, R.J. McAlarney, E.W. Cummings, D.A. Pabst, W.A. McLellan, and S.G. Barco. 2016. *Aerial Survey Baseline Monitoring in the Continental Shelf Region of the VACAPES OPAREA: 2015 Annual Progress Report*. Prepared for U.S. Fleet Forces Command. Submitted to Naval Facilities Engineering Command Atlantic, Norfolk, Virginia, under Contract No. N62470-15-D-8006, Task Order 05, issued to HDR, Inc., Virginia Beach, Virginia. March 2016.

Cover Photo Credits:
A North Atlantic right whale (*Eubalaena glacialis*) swimming with the mouth open, exhibiting behavior consistent with feeding. Photo taken by Sarah Mallette under National Marine Fisheries Service (NMFS) Scientific Research Permit 16473, held by Dr. D. Ann Pabst at UNC Wilmington.

This project is funded by U.S. Fleet Forces Command and managed by Naval Facilities Engineering Command Atlantic as part of the US Navy's marine species monitoring program.

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Acronyms and Abbreviations

AOC	Aircraft Operations Center
AFTT	Atlantic Fleet Training and Testing
BSS	Beaufort sea state
CFR	Code of Federal Regulations
CREEM	Centre for Research into Ecological and Environmental Modeling
EST/EDT	Eastern Standard Time/Eastern Daylight Time
ESA	Endangered Species Act
FBO	Fixed-base Operator
GA	General Authorization
GPS	Global Positioning System
NAVFAC	Naval Facilities Engineering Command
NMFS	National Marine Fisheries Service
UNCW	University of North Carolina Wilmington
U.S.	United States
UTC	Coordinated Universal Time
VACAPES OPAREA	Virginia Capes Operating Area
VAQF	Virginia Aquarium Foundation
VA WEA	Virginia Wind Energy Area
VFR	standards and under visual flight regulations

1. Background and Introduction

The Virginia Aquarium & Marine Science Center Foundation, Inc. (VAQF) has been tasked to conduct aerial surveys for the continental shelf region off the mouth of the Chesapeake Bay within the Virginia Capes Operating Area (VACAPES OPAREA) to provide marine species monitoring services. The current study area encompasses an approximately 6,500-square-kilometer area off the coast of Virginia extending from the southern eastern shore of Virginia to the North Carolina/Virginia state border. These efforts will contribute baseline protected species occurrence data including species distribution, abundance, density estimates, and seasonal habitat usage. These surveys will complement existing United States (U.S.) Navy marine species monitoring efforts [Aerial Survey Baseline Monitoring- Atlantic Fleet Training and Testing (AFTT)] off the east coast of the United States and be used to support environmental planning and regulatory compliance. VAQF will conduct fixed-wing aerial line-transect surveys, using distance sampling protocols, to document the occurrence of marine mammals and sea turtles. VAQF will work closely with the University of North Carolina Wilmington (UNCW) to maintain consistency among the safety, flight and data reporting protocols for Hatteras/Onslow/JAX baseline monitoring projects. The aerial survey design was established based upon advisements from the Centre for Research into Ecological and Environmental Modeling (CREEM) at the University of St. Andrews and objectives identified by the U.S. Navy.

2. Methods

2.1 Aerial Survey Overview

VAQF has conducted line-transect aerial surveys in the vicinity of the Virginia Wind Energy Area (VA WEA) since 2012 with the objective of documenting large whale occurrence, although surveys were not flown every month or with consistent effort between years (Mallette *et al.* 2014, 2015). This previous work was funded through the Virginia Coastal Zone Management Program, and ended in 2015. To build upon the existing dataset in the proximity of the VA WEA, these previously established transect lines were modified based upon recommendations from CREEM and discussions with UNCW and the Navy to manage overlap between the coastal (VAQF) and recently established offshore VA (UNCW) survey site. Eighteen survey days are allotted to VAQF to continue surveys of continental shelf region off the mouth of the Chesapeake Bay within the VACAPES OPAREA during 2016.

The VAQF survey area encompasses an approximately 6,500-square-kilometer area. CREEM advised periodic overlap of the survey area between the established UNCW offshore and updated VAQF coastal transect lines to calibrate for survey origin difference and integrate data between sites. Therefore, two survey designs were established relative to the existing UNCW survey lines (1) *Overlap*: the eastern end of all transect lines overlap 10 kilometers with the western end of the offshore UNCW lines (**Table 1; Figure 1**), and (2) *Truncated* (No Overlap): transect lines do not overlap with the offshore UNCW transect lines (**Table 2; Figure 1;** *i.e.* the eastern end of the VAQF lines terminate at the longitude of the western end of the UNCW lines). The overlap survey design will be flown quarterly and during each season to achieve the periodicity of overlap CREEM advised.

Table 1: *Overlap* transect coordinates including both east and west endpoints. This survey design includes 14 transect lines.

Transect	Direction	Latitude	Longitude
0	east	36.55352	-75.05009
0	west	36.55054	-75.84462
1	east	36.61305	-75.05013
1	west	36.60995	-75.86152
2	east	36.67258	-75.05017
2	west	36.66928	-75.88874
3	east	36.73113	-75.05021
3	west	36.72761	-75.91646
4	east	36.79095	-75.05024
4	west	36.78727	-75.93766
5	east	36.84997	-75.05028
5	west	36.84616	-75.95269
6	east	36.90948	-75.05032
6	west	36.90554	-75.96906
7	east	36.96784	-75.05036
7	west	36.96382	-75.97857
8	east	37.03023	-75.05040
8	west	37.02638	-75.95745
9	east	37.08894	-75.05044
9	west	37.08526	-75.93570
10	east	37.14920	-75.05048
10	west	37.14611	-75.85745
11	east	37.20776	-75.05052
11	west	37.20508	-75.79796
12	east	37.26698	-75.05056
12	west	37.26437	-75.78844
13	east	37.32621	-75.05060
13	west	37.32400	-75.72454

Table 2: Truncated (No-overlap) transect coordinates including both east and west endpoints. This survey design includes 14 transect lines.

Transect	Direction	Latitude	Longitude
0	east	36.55343	-75.15952
0	west	36.55054	-75.84462
1	east	36.61296	-75.15965
1	west	36.60995	-75.86152
2	east	36.67249	-75.15977
2	west	36.66928	-75.88874
3	east	36.73103	-75.15989
3	west	36.72761	-75.91646
4	east	36.79086	-75.16002
4	west	36.78727	-75.93766
5	east	36.84987	-75.16014
5	west	36.84616	-75.95269
6	east	36.90938	-75.16026
6	west	36.90554	-75.96906
7	east	36.96774	-75.16038
7	west	36.96382	-75.97857
8	east	37.03013	-75.16052
8	west	37.02638	-75.95745
9	east	37.08885	-75.16064
9	west	37.08526	-75.93570
10	east	37.14911	-75.16077
10	west	37.14611	-75.85745
11	east	37.20766	-75.16089
11	west	37.20508	-75.79796
12	east	37.26688	-75.16102
12	west	37.26437	-75.78844
13	east	37.32611	-75.16066
13	west	37.32400	-75.72454

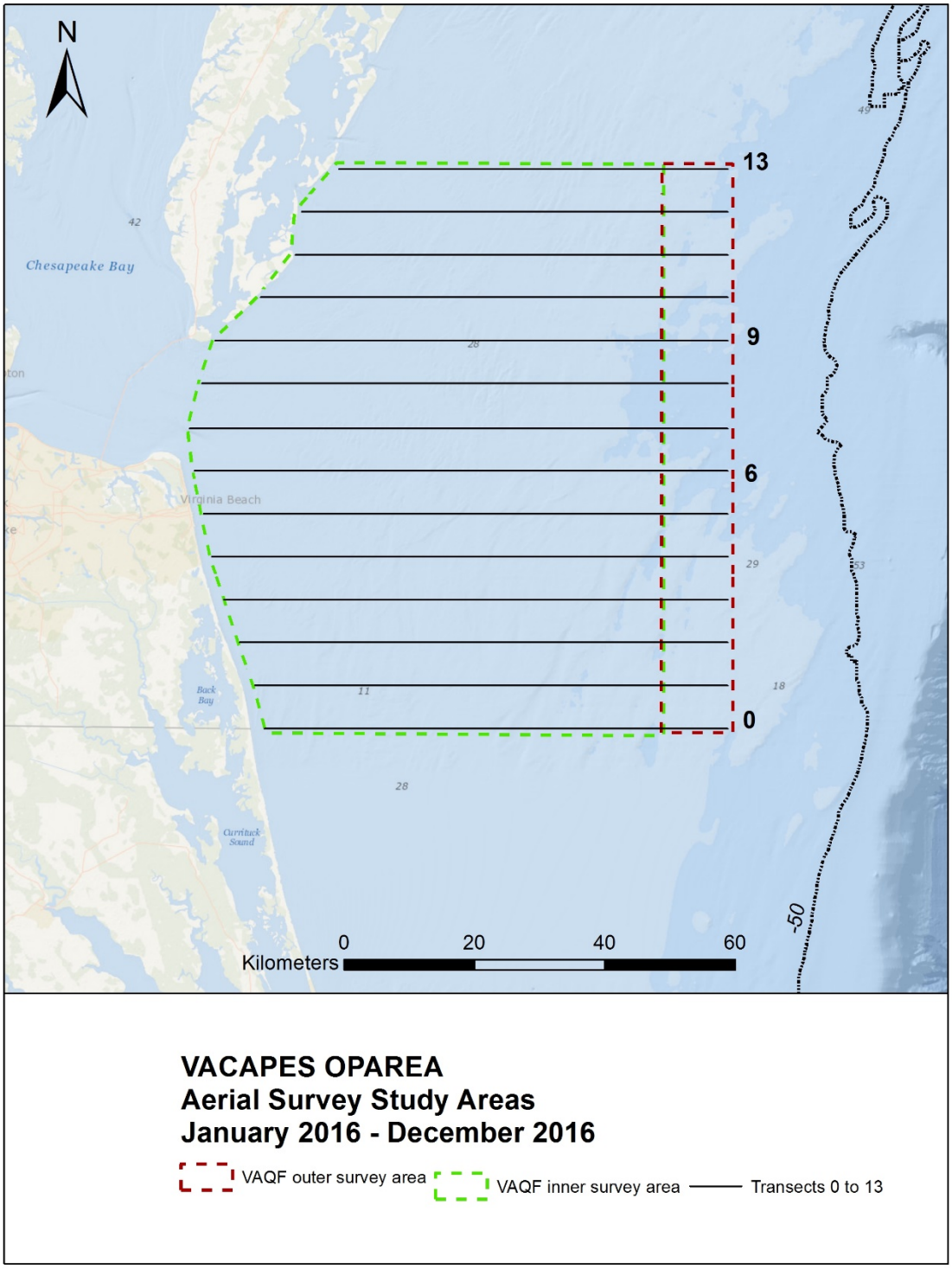

Figure 1. VACAPES OPAREA survey area and transect lines. *Truncated* survey boundary delineated by the green dashed line. Ten km overlap with the western end of the UNCW offshore transect lines are delineated by the red dashed line. *Overlap survey includes area within both the green and red dashed lines*

Surveys will be conducted monthly within the survey area to document the occurrence and distribution of protected marine mammals and sea turtles. To achieve the allocated 18 survey days, two days of monthly survey are planned for November – April when large whale presence is highest in the area, while the other six months will each include one survey day. VAQF will coordinate with UNCW's flight team as necessary to avoid airspace and resource conflicts. Flights will maintain consistency among general flight and safety guidelines. See flight protocol below.

2.2 Flight Protocol

Survey flights typically originate from the Fixed-base Operator (FBO) in Norfolk, Virginia. Aerial survey, data collection and management protocols are consistent with ongoing surveys being conducted under the Navy's marine species monitoring program in the offshore VACAPEs and Jacksonville areas. Aerial surveys will be carried out in over-wing, twin-engine, Cessna 337 aircrafts, which are maintained under provisions of 14 Code of Federal Regulations (CFR) Part 135 provided by Orion Aviation. Each plane is equipped with electronic positioning equipment and safety gear required for carrying out aerial surveys. Two pilots are used for each flight. Both pilots meet requirements as specified in 14 CFR Part 135; the pilot-in-command and crew meet or exceed all NOAA offshore flight safety requirements. The survey team includes two observers and a coordinator. Surveys are flown only in safe operating conditions according to NOAA Aircraft Operations Center (AOC) standards and under visual flight regulations (VFR) flight conditions. Aerial surveys for endangered species are conducted under NMFS Scientific Research Permit 16473, held by Dr. D. Ann Pabst at UNC Wilmington and non-listed marine mammal species under Scientific Research General Authorization (GA) permit 17325 issued to VAQF.

Surveys will be flown at an altitude of 305 meters (1,000 feet) and operational airspeeds of approximately 161 kilometers per hour (100 miles per hour). Two observers, one positioned on each side of the aircraft, carry out the surveys. The plane is equipped with a Global Navigation System (GPS) to permit precise track-line fidelity. Each observer has an independent GPS to record precise time and geographic position of all marine mammal and sea turtle sightings. All times are in local EST/EDT time (UTC-5/4). Codes are used to identify and document discrete events throughout the survey.

Environmental parameters including visibility, Beaufort sea state (BSS), cloud cover, and glare are collected throughout the survey period and each time and event are recorded. When a cetacean sighting occurs, the initial location on the track-line is recorded and the plane breaks from the track-line. The sighting cues, vertical and horizontal angles of the initial sighting relative to the observer's vantage point in the plane are recorded at the time of the sighting. When the plane is directly over the animals' the location, species identification, reliability of species ID, and group size (minimum, maximum, and best estimate) are collected. Observers also record perpendicular distance from the transect line of all sea turtle, other marine vertebrate, small and large vessel locations, although do not break track for these sightings.

Additionally, track is not broken when bottlenose dolphins are observed in the nearshore waters within 20 nautical miles of shore, although standard sighting data are documented. This approach was established to maximize efficiency of survey effort in areas where the spatial

distribution and relative abundance of coastal bottlenose dolphins has previously been established (Barco *et al.* 1999; Torres *et al.* 2003; Torres *et al.* 2005).

If a sighting occurs off effort or while transiting to or from the survey area or between transect lines it is recorded as an “off effort” sighting. Any cetaceans the survey team encounters while investigating a separate sighting queue are also considred off effort. If two species are seen associated with the same sighting queue both are considered on effort. Total number of individuals is based upon the best estimate of group size of each species.

3. Progress to Date

VAQF has worked closely with UNCW, the Navy and under the advisement of CREEM on transect line development to achieve the objectives identified by the U.S. Navy. Transect lines and survey design have been finalized. The no overlap coastal transect lines were flown once in January. During February the overlap coastal transect lines will be flown as soon as weather permits. Surveys will be completed monthly for one year, as weather allows.

4. Literature Cited

Barco, S.G., M.W. Swingle, M.A. McLellan, R.N. Harris, and D.A. Pabst. 1999. Local abundance and distribution of bottlenose dolphins (*Tursiops truncatus*) in the nearshore waters of Virginia Beach, Virginia. *Marine Mammal Science* 15:394-408.

Mallette, S.D., G.G. Lockhart, R.J. McAlarney, E.W. Cummings, D.A. Pabst, W.A. McLellan, and S.G. Barco. 2014. *Documenting Whale Migration off Virginia’s Coast for Use in Marine Spatial Planning*. VAQF Scientific Report 2014-08. Virginia Aquarium & Marine Science Center Foundation, Virginia Beach, Virginia.

Mallette, S.D., G.G. Lockhart, R.J. McAlarney, E.W. Cummings, D.A. Pabst, W.A. McLellan and S.G. Barco. 2015. *Documenting Whale Migration off Virginia’s Coast for Use in Marine Spatial Planning: Aerial Surveys in the Proximity of the Virginia Wind Energy Area (VA WEA)*. VAQF Scientific Report 2015-02. Virginia Aquarium & Marine Science Center Foundation, Virginia Beach, Virginia.

Torres, L.G., P.E. Rosel, C. D’Agrosa, and A.J. Read. 2003. Improving management of overlapping bottlenose dolphin ecotypes through spatial analysis and genetics. *Marine Mammal Science* 19(3):502-514.

Torres, L.G., McLellan, W.A., Meagher, E.M. and D.A. Pabst. 2005. Seasonal distribution and relative abundance of bottlenose dolphins, (*Tursiops truncatus)*, along the US mid-Atlantic coast. *Journal of Cetacean Research and Management* 7(2):153-161.

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